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Project director	Rodgers Michael
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#1

Illinois 99 Remote Emissions Survey

Conducted by the Air Quality Laboratory,
Georgia Institute of Technology
In Cooperation with Environmental Systems Products, Inc.

Glossary

AQL	Air Quality Laboratory
CO	Carbon Monoxide
CO2	Carbon Dioxide
EPA	Environmental Protection Agency
GIT	Georgia Institute of Technology
HC	Hydrocarbons (typical formula, CnH2n+2, but also CnH2n, and CnH2n-2)
I/M	Inspection and Maintenance
IR	Infrared
NDIR	Non-Dispersive Infrared Spectroscopy
NOx	Nitric Oxides
PPM	Parts Per Million (also PPM)
RSD	Remote Sensing Device
ESP	Environmental Systems Products, Incorporated
SDM	Source-Detector Module
RDB	Vehicle Registration Database
RPM	Revolutions per minute
VIN	Vehicle Identification Number
VOC	Volatile Organic Compounds (hydrocarbons and carbonyl carbons, which are double bonded to oxygen)
Mean	Average
St. Dev.	Standard Deviation

1. DATA COLLECTION

This report contains description of data collection results. They are represented as files in MS Office 97 software formats and in the tables below.

Procedures of site selection, data collection and data processing were described earlier in the Proposal "Illinois Remote Emissions Survey", submitted to Illinois EPA. From total number of 18 initially evaluated sites 15 sites were selected for remote sensing observations. List of sites in given 11 counties, with enhanced I/M program and data collection goals for each county are shown in the **Table 2**.

Two RSD units were used during the data collection period—unit 527 RSD2000, belonging to ESP, and unit 418 RSD2000, belonging to GIT. The GIT and ESP team tested both units, initially at ESP, Tucson, and then, during the period of the study, at an Envirotest facility at Hartford, CN. During the eleven days data collection period, 55718 vehicles triggered the RSD (total beam blocks), and 30188 vehicles had valid reading for CO, HC, NOx and Speed/Acceleration (S/A). At least 28766 had readable license plates and valid CO, HC, NOx, S/A (see Table 1). All data were transferred successfully to GIT for processing.

Original software developed by GIT allowed fast data import into MS Access and preliminary analysis of results for each data collection day and total data collected to this day (major statistics of CO, HC, NOx, Speed and Acceleration). This represents very significant improvement of data collection process since necessary corrections and some important conclusions can be done before completion of data processing. Software uses RSD data text files created by dumpvdf.exe and Siterep.txt created by Siterep.exe programs. Both files are loaded into the same database that was created before for site selection process.

Complete description of tables related to data collection follows below: Table 4, Table 5, Table 6 and Table 7.

Table 1. Analysis of sampling results.

Beam Blocks	Valid 3 gases and Speed/ Accel	% Of Valid to Beam Blocks	Readable IL Plates with all valid data	% To Valid 3 gases and Speed/ Accel	Other States	% To Valid 3 gases and Speed/ Accel
55718	**30188**	**54.18**	**28766**	**95.29**	**1245**	**4.12**

Table 2 Goal and Collected Data Statistics

	Raw Goal	Raw Collected	Valid Goal	Valid Gas & S/A collected	Valid Gas & S/A & Lic. Plate collected	Excess
Cook-Chicago	9927	14209	4964	7906	7579	2616
Cook-Suburban	12771	11929	6385.5	7614	7142	757
Dupage	4883	3973	2441.5	2740	2678	237
Kane	2030	6064	1015	1852	1771	756
Kendal	270	259	135	199	197	62
Lake	3276	4136	1638	1986	1890	252
Madison	1527	3278	763.5	1411	1305	542
McHenry	1358	4054	679	2370	2248	1569
Monroe	170	778	85	243	213	128
St. Clair	1468	3179	734	1839	1759	1025
Will	2321	3859	1160.5	2028	1984	824
Totals	40001	55718	20001	30188	28766	8766

Data were recorded on a single CD-ROM (tagged in accordance with internal standards of GIT's Air Quality Laboratory). The CD-ROM was sent to Illinois in MS Word and Excel formats (with file extensions ".doc", ".xls" respectively). List of files and their contents follow in Table 3. Various codes and abbreviations employed are found in glossary.

Table 3 CD-ROM data files and descriptions

1. Illinois 99report.doc	Present report
2. Summary Data Collection Report For Illinois99.doc	Summary of data collection
3. Summary Site Report For Illinois 99.doc	List of all sites
4. Data Collection Report Illinois1999.doc	Detailed daily report of data Collection
5. Working Site Report for Illinois 99.doc	List of sites selected for remote sensing
6. RemoteDatahist.xls	Histograms for all valid readings
7. StateLPhist.xls	Histograms for IL state vehicles
8. OutOfStateLPhist.xls	Histograms for non state vehicles
9. Illinois99.mdb	Data base with all tables
10. ***.jpg** (18 picture)	Digital pictures of sites
11. ***.bmp** (18 sketches)	Digital sketches of sites

Table 4 "Sites" table fields format and description

Field Name	Format	Description
1. SiteID	Text	Unique Site Identifier (number or number and letter without space)
2. Abbreviation	Text	Optional site name abbreviation
3. Location	Text	Description of site location in local road and highway naming convention.
4. ZIP	Number	Optional ZIP code for location
5. Memo	Text	Automatically enters number of cars, vans, truck and pickups; may have any additional data, such as itinerary or directions, or traffic condition.
6. Grade	Number	Slope grade in percent measured by grade master
7. Speed	Number	Average vehicle speed S for site measured by laser gun
8. Traffic	Number	Traffic count for site.
9. Rating	Number	Rating of site in conventional units from 0 to 10.
10. Latitude	Text	Latitude of site in Degree and Minutes with two digits after decimal.
11. Longitude	Text	Longitude of site in Degree and Minutes with two digits after decimal.
12. City	Text	Name of City
13. County	Text	Name of County.
14. State	Text	Name of State.
15. Country	Text	Name of Country
16. SiteTypes	Number	Number representing the site type (1 to 6) (????)
17. EvaluatedName	Text	Name of person who evaluated this site.
18. EDate	Text	Date of evaluation.
19. ETime	Text	Time of Evaluation
20. Picture	Text	Name of file saved in same directory as database, represents digital picture of site.
21. Sketch	Text	Name of file saved in same directory as database, represents digital sketch of site.
22. Checked	Boolean	Check box: checked in list view used for printing options.
23. SFR	Number	Single lane operation coefficient 0 or 1. 1 - for single line.
24. SER	Number	Coefficient of space requirement. 1 for sufficient space.
25. DSR	Number	Site observation coefficient. 1 for properly observable site.
26. TIR	Number	Traffic light and intersection location. 1 for remote location.
27. DAR	Number	Driver behavior coefficient. 1 for not too defensive or aggressive.
28. ST	Number	Site Type coefficient. 1 for ramp entrance and middle of road.
29. GR	Number	Geographic location suitable for fleet evaluation is 1.
30. DR	Number	Fleet composition coefficient. 1 for mixed traffic mostly sedan, vans and pickups.
31. DPT	Number	Diurnal pattern of traffic. 1 for whole day traffic.

32. DBR	Number	Breaking or idle traffic coefficient. 0 for breaking or idle.
33. SLR	Number	Road slope coefficient, automatically calculated from Grade input.
34. RT	Number	Total rating for site.

Table 5 "RemoteData" Table fields, formats, and descriptions

Field Name	Format	Description
1. RSDUnitNumber	Integer	SDM unit identification number
2. VehicleSequence	Long Integer	Sequence Vehicle number
3. Date	Text, DD/MM/YYYY	Date of Remote Sensing Measurement
4. Time	Text, hh:mm:ss	Time of Remote Sensing Measurement
5. CO	Double	Remote Sensing CO Measurement in %
6. COFlag	Text	CO measurement validation: V – valid, S – suspect, X – invalid, E – insufficient plume, N – data does not exist
7. CO2	Double	Remote Sensing CO2 Measurement in %
8. CO2Flag	Text	CO2 validation (same as above for CO)
9. MaxCO2	Double	Maximum of CO2 concentration in the volume of air covered by IR beam, as related to calibration
10. CO2Volume	Double	Integrated in time CO2 concentration in the beam
11. HCppm	Double	Remote Sensing HC Measurement in PPM of Hexane
12. HCFlag	Text	HC validation (same as above)
13. NOxppm	Double	Remote Sensing NOx Measurement in PPM
14. NoxFlag	Text	NOx validation (same as above)
15. Opacity	Text	Exhaust plume opacity as measured in reference channel
16. OpacityFlag	Text	Opacity validation (same as above)
17. ColdStart	Boolean	Estimation of cold start probability from absorption in H2O vapor channel, not functioning
18. Speed	Double	Vehicle speed in mph
19. SpeedFlag	Text	Speed validation (same as above)
20. Acceleration	Double	Vehicle acceleration in mph/sec
21. AccelerationFlag	Text	Acceleration validation (same as above)
22. SpeedAcceleration	Text	Units of measurement for speed/acceleration, E– means English
23. LicensePlate	Text	License Plate of the vehicle
24. LicensePlateFlag	Text	See below separate paragraph
25. LicensePlateType	Text	See below separate paragraph

The following are values found in the License Plate Flag and License Plate Type fields. Values are assigned during license plate editing

License Plate Flag	License Plate Type
A – Automatic plate reading	
C – Changed license plate after automatic reading	
E – Automatic License Plate Reader Disabled **Remark**: In case of manual license plate entry 'M' should replace 'E'. Recent version of software in most cases does not do it i.e. 'E' is equivalent to 'M'.	
M – Manually typed the entire plate	
N – No plate	
U – Unreadable	HIT – Trailer Hitch OBS – Obstruction on the vehicle MUD – Mud or Snow on the license plate DRK – Too Dark/Blurry/Glare VEW – Only part of the license plate can be seen on the picture
O – Out of State	Two latter state abbreviation or OS if State Unknown
P – Special Plate	AFF – Affinity DIS – Disabled ENV – Environmental DLR – Dealer plate STA – State owned vehicle TMP – Temporary license plate VET – Veteran
T – Trailer	
X – No Vehicle	
Y- Motorcycle	
Z – Tractor-trailer, Buses, Large diesel-powered vehicles	

Table 6 "DataCollection" Table Data fields, formats, and descriptions

Field Name	Format	Description
1. SiteID	Text	Unique identifier number or letter without space
2. RSDUnitNum	Number	SDM identification number
3. MDate	Text	Date of data collection
4. StartTime	Text	Time of first measurement
5. EndTime	Text	Time of last measurement
6. Operator	Text	Operator's name
7. Notes	Text	Memo for helpful notices
8. CalibrationsPerformed	Number	Number of calibrations performed
9. CalibrationOverrides	Number	Number of calibrations overrides
10. AverageTraffic	Number	Hourly traffic, calculation based on number of beam blocks
11. AverageSpeed	Number	Average speed for captured vehicles
12. StDevSpeed	Number	Standard Deviation of speed
13. SpeedCount	Number	Count of valid speed readings
14. AverageAcceleration	Number	Average acceleration for captured vehicles
15. StDevAcceleration	Number	Standard Deviation of acceleration
16. AccelerationCount	Number	Count of valid acceleration readings
17. BeamBlock	Number	Number of triggered vehicles
18. Valid	Number	Number of reading with all data valid (4 gases and speed/acceleration)
19. StateLP	Number	Number of visible License Plate belong to State
20. LPVisible	Number	Number of visible License Plate
21. MatchedRDB	Number	Number of License Plate matched with Registration Data Base
22. MeanCO	Number	Average CO
23. StDevCO	Number	Standard Deviation CO
24. ValidCO	Number	Number of valid reading CO
25. MeanHC	Number	Average HC
26. StDevHC	Number	Standard Deviation HC
27. ValidHC	Number	Number of valid reading HC
28. MeanNOx	Number	Average NOx
29. StDevNOx	Number	Standard Deviation NOx
30. ValidNOx	Number	Number of valid reading NOx

Table 7 "ReportCalibration: Table Data fields, formats, and descriptions

Field Name	Format	Description
1. RSDUnitNum	Number	SDM identification number
Mdate	Text	Date of remote sensing
CalNum	Number	Calibration Identification number for this Day.
StartTime	Text	Time when measurements were interrupted for calibration
EndTime	Text	Time when calibration is finished.
CObefor	Number	CO before calibration
COafter	Number	CO after calibration
CO2befor	Number	CO2 before calibration
CO2after	Number	CO2 after calibration
HCbefor	Number	HC before calibration
HCafter	Number	HC after calibration
NOxbefor	Number	NOx before calibration
NOxafter	Number	NOx after calibration

Summary Data Collection Report For Illinois 99

14-Jan-00 12:43 PM

Site ID: 8	RSD Unit Number: 527	Date: 12/09/1999	
Start: 08:54:56	End: 16:04:38	Operator: Prokofiy and Juanita	
Calibrations Performed: 10		Average Traffic: 569	Beam Block: 4054
License Plate-	Visible: 2816	State: 2650	Matched RDB: 0
Speed-	Average: 39	St. Dev.: 6.2513	Count: 3771
Acceleration-	Average: -0.42	St. Dev.: 0.8560	Count: 3771
CO-	Average: 0.31	St. Dev.: 0.8578	Count: 3208
HC-	Average: 67	St. Dev.: 112.60	Count: 3182
NOx-	Average: 651	St. Dev.: 834.28	Count: 2483

All Valid Data = 2370

Site ID: 9	RSD Unit Number: 527	Date: 12/10/1999	
Start: 07:54:24	End: 16:26:11	Operator: Prokofiy and Juanita	
Calibrations Performed: 13		Average Traffic: 712	Beam Block: 6064
License Plate-	Visible: 2804	State: 2723	Matched RDB: 0
Speed-	Average: 34	St. Dev.: 5.9354	Count: 5545
Acceleration-	Average: 8.22	St. Dev.: 1.2882	Count: 5469
CO-	Average: 0.24	St. Dev.: 0.6935	Count: 3063
HC-	Average: 73	St. Dev.: 130.94	Count: 3015
NOx-	Average: 440	St. Dev.: 685.76	Count: 1971

All Valid Data = 1852

Site ID: 7	RSD Unit Number: 418	Date: 12/10/1999	
Start: 13:29:28	End: 17:35:07	Operator: Mikhail and Joanna	
Calibrations Performed: 3		Average Traffic: 825	Beam Block: 3372
License Plate-	Visible: 1770	State: 1696	Matched RDB: 0
Speed-	Average: 29	St. Dev.: 5.8770	Count: 3054
Acceleration-	Average: 0.46	St. Dev.: 1.4674	Count: 3009
CO-	Average: 0.26	St. Dev.: 0.8167	Count: 1972
HC-	Average: 51	St. Dev.: 99.63	Count: 1959
NOx-	Average: 687	St. Dev.: 909.31	Count: 1883

All Valid Data = 1702

Site ID: 1	RSD Unit Number: 527	Date: 12/11/1999	
Start: 09:51:20	End: 16:16:00	Operator: Prokofiy and Juanita	
Calibrations Performed: 9		Average Traffic: 942	Beam Block: 6010
License Plate-	Visible: 5091	State: 4968	Matched RDB: 0
Speed-	Average: 21	St. Dev.: 4.3846	Count: 4744
Acceleration-	Average: 1.54	St. Dev.: 2.2871	Count: 4489
CO-	Average: 0.31	St. Dev.: 0.8118	Count: 5498
HC-	Average: 80	St. Dev.: 300.54	Count: 5367
NOx-	Average: 563	St. Dev.: 775.17	Count: 5000

All Valid Data = 3907

Site ID: 2 RSD Unit Number: 527 Date: 12/12/1999
Start: 09:50:32 End: 16:08:56 Operator: Mikhail Juanita Joanna
Calibrations Performed: 7 Average Traffic: 107 Beam Block: 670
License Plate- Visible: 494 State: 467 Matched RDB: 0
Speed- Average: 24 St. Dev.: 4.1899 Count: 611
Acceleration- Average: 0.30 St. Dev.: 1.5112 Count: 606
CO- Average: 0.23 St. Dev.: 0.6410 Count: 556
HC- Average: 19 St. Dev.: 78.08 Count: 550
NOx- Average: 479 St. Dev.: 664.23 Count: 493
All Valid Data = 478

Site ID: 4 RSD Unit Number: 527 Date: 12/13/1999
Start: 08:55:01 End: 16:24:10 Operator: Mikhail
Calibrations Performed: 8 Average Traffic: 705 Beam Block: 5249
License Plate- Visible: 3368 State: 3251 Matched RDB: 0
Speed- Average: 37 St. Dev.: 6.5489 Count: 4810
Acceleration- Average: 0.20 St. Dev.: 1.2656 Count: 4809
CO- Average: 0.24 St. Dev.: 0.6853 Count: 4054
HC- Average: 31 St. Dev.: 87.46 Count: 3912
NOx- Average: 556 St. Dev.: 733.78 Count: 3463
All Valid Data = 3229

Site ID: 5 RSD Unit Number: 418 Date: 12/16/1999
Start: 10:12:16 End: 16:10:19 Operator: Prokofiy and Juanita
Calibrations Performed: 4 Average Traffic: 432 Beam Block: 2567
License Plate- Visible: 1791 State: 1683 Matched RDB: 0
Speed- Average: 42 St. Dev.: 5.3967 Count: 2404
Acceleration- Average: 0.77 St. Dev.: 0.9553 Count: 2401
CO- Average: 0.41 St. Dev.: 1.1008 Count: 2032
HC- Average: 73 St. Dev.: 142.42 Count: 1902
NOx- Average: 1073 St. Dev.: 1174.17 Count: 1934
All Valid Data = 1760

Site ID: 10 RSD Unit Number: 527 Date: 12/16/1999
Start: 10:44:20 End: 16:37:21 Operator: Mikhail
Calibrations Performed: 9 Average Traffic: 294 Beam Block: 1718
License Plate- Visible: 1105 State: 1039 Matched RDB: 0
Speed- Average: 35 St. Dev.: 5.9608 Count: 1649
Acceleration- Average: 0.98 St. Dev.: 1.2437 Count: 1647
CO- Average: 0.42 St. Dev.: 1.0724 Count: 1236
HC- Average: 76 St. Dev.: 268.55 Count: 1025
NOx- Average: 735 St. Dev.: 922.06 Count: 685
All Valid Data = 603

Site ID: 11 RSD Unit Number: 418 Date: 12/18/1999
Start: 07:52:44 End: 16:15:41 Operator: Prokofiy and Benney
Calibrations Performed: 6 Average Traffic: 912 Beam Block: 7635
License Plate- Visible: 5975 State: 5581 Matched RDB: 0
Speed- Average: 26 St. Dev.: 7.3231 Count: 7196
Acceleration- Average: 0.90 St. Dev.: 1.3971 Count: 7164
CO- Average: 0.36 St. Dev.: 0.9446 Count: 6384
HC- Average: 71 St. Dev.: 164.21 Count: 6201
NOx- Average: 962 St. Dev.: 1155.34 Count: 6166
All Valid Data = 5818

Site ID: 12 RSD Unit Number: 527 Date: 12/18/1999
Start: 08:48:10 End: 12:22:55 Operator: Mikhail
Calibrations Performed: 4 Average Traffic: 1359 Beam Block: 4856
License Plate- Visible: 2051 State: 1968 Matched RDB: 0
Speed- Average: 37 St. Dev.: 13.5368 Count: 4397
Acceleration- Average: 6.83 St. Dev.: 1.3955 Count: 4392
CO- Average: 0.19 St. Dev.: 0.5472 Count: 2226
HC- Average: 42 St. Dev.: 131.76 Count: 2207
NOx- Average: 490 St. Dev.: 756.77 Count: 1580
All Valid Data = 1485

Site ID: 5 RSD Unit Number: 5271 Date: 12/18/1999
Start: 13:49:36 End: 16:50:00 Operator: Mikhail
Calibrations Performed: 5 Average Traffic: 470 Beam Block: 1406
License Plate- Visible: 1038 State: 992 Matched RDB: 0
Speed- Average: 41 St. Dev.: 5.3177 Count: 1375
Acceleration- Average: 1.03 St. Dev.: 0.9540 Count: 1375
CO- Average: 0.40 St. Dev.: 0.9990 Count: 1222
HC- Average: 41 St. Dev.: 87.63 Count: 1201
NOx- Average: 517 St. Dev.: 648.39 Count: 1011
All Valid Data = 980

Site ID: 13 RSD Unit Number: 527 Date: 12/19/1999
Start: 09:24:56 End: 15:01:58 Operator: Mikhail
Calibrations Performed: 7 Average Traffic: 598 Beam Block: 3346
License Plate- Visible: 2403 State: 2347 Matched RDB: 0
Speed- Average: 32 St. Dev.: 5.3982 Count: 3219
Acceleration- Average: 0.13 St. Dev.: 0.8513 Count: 3213
CO- Average: 0.54 St. Dev.: 1.4316 Count: 2619
HC- Average: 133 St. Dev.: 259.91 Count: 2185
NOx- Average: 540 St. Dev.: 732.21 Count: 1880
All Valid Data = 1664

Site ID: 13 RSD Unit Number: 418 Date: 12/19/1999
Start: 13:58:11 End: 15:06:22 Operator: Prokofiy and Benney
Calibrations Performed: 1 Average Traffic: 457 Beam Block: 513
License Plate- Visible: 379 State: 369 Matched RDB: 0
Speed- Average: 31 St. Dev.: 5.3802 Count: 487
Acceleration- Average: 5.18 St. Dev.: 1.1061 Count: 486
CO- Average: 0.34 St. Dev.: 1.0357 Count: 421
HC- Average: 82 St. Dev.: 134.19 Count: 405
NOx- Average: 864 St. Dev.: 990.59 Count: 390
All Valid Data = 364

Site ID: 7 RSD Unit Number: 4181 Date: 12/19/1999
Start: 07:15:07 End: 10:06:31 Operator: Prokofiy and Benney
Calibrations Performed: 2 Average Traffic: 268 Beam Block: 764
License Plate- Visible: 342 State: 333 Matched RDB: 0
Speed- Average: 38 St. Dev.: 6.9388 Count: 669
Acceleration- Average: 0.58 St. Dev.: 1.6728 Count: 658
CO- Average: 0.22 St. Dev.: 0.6224 Count: 378
HC- Average: 76 St. Dev.: 167.02 Count: 358
NOx- Average: 827 St. Dev.: 1018.76 Count: 337
All Valid Data = 284

Site ID: 18 RSD Unit Number: 4182 Date: 12/19/1999
Start: 11:35:10 End: 12:51:34 Operator: Prokofiy and Benney
Calibrations Performed: 1 Average Traffic: 204 Beam Block: 259
License Plate- Visible: 181 State: 178 Matched RDB: 0
Speed- Average: 17 St. Dev.: 3.1756 Count: 248
Acceleration- Average: -0.28 St. Dev.: 1.0209 Count: 248
CO- Average: 0.32 St. Dev.: 0.8857 Count: 230
HC- Average: 51 St. Dev.: 91.85 Count: 222
NOx- Average: 668 St. Dev.: 939.69 Count: 214
All Valid Data = 199

Site ID: 14 RSD Unit Number: 519 Date: 12/14/1999
Start: 08:48:16 End: 12:00:12 Operator: FRANK CARDINALE AND CRUZ RIOS
Calibrations Performed: 6 Average Traffic: 256 Beam Block: 778
License Plate- Visible: 283 State: 250 Matched RDB: 0
Speed- Average: 26 St. Dev.: 5.3159 Count: 731
Acceleration- Average: -0.24 St. Dev.: 1.4935 Count: 723
CO- Average: 0.31 St. Dev.: 1.0006 Count: 309
HC- Average: 178 St. Dev.: 522.04 Count: 264
NOx- Average: 394 St. Dev.: 661.78 Count: 286
All Valid Data = 243

Site ID: 16 RSD Unit Number: 519 Date: 12/15/1999
Start: 07:50:25 End: 12:53:26 Operator: FRANK CARDINALE AND CRUZ RIOS
Calibrations Performed: 6 Average Traffic: 663 Beam Block: 3179
License Plate- Visible: 1492 State: 1418 Matched RDB: 0
Speed- Average: 35 St. Dev.: 5.7039 Count: 3074
Acceleration- Average: 0.37 St. Dev.: 1.0251 Count: 3053
CO- Average: 0.30 St. Dev.: 0.9347 Count: 1983
HC- Average: 46 St. Dev.: 191.47 Count: 1931
NOx- Average: 645 St. Dev.: 762.74 Count: 1927
All Valid Data = 1839

Site ID: 17 RSD Unit Number: 519 Date: 12/16/1999
Start: 08:20:12 End: 13:00:07 Operator: FRANK CARDINALE AND CRUZ RIOS
Calibrations Performed: 9 Average Traffic: 742 Beam Block: 3278
License Plate- Visible: 1398 State: 1309 Matched RDB: 0
Speed- Average: 26 St. Dev.: 5.6629 Count: 2944
Acceleration- Average: 0.33 St. Dev.: 1.4280 Count: 2893
CO- Average: 0.30 St. Dev.: 0.7866 Count: 1654
HC- Average: 79 St. Dev.: 168.53 Count: 1581
NOx- Average: 498 St. Dev.: 675.66 Count: 1618
All Valid Data = 1411

Total for All 18 Work Days Beam Blocks: 55718
License Plate- Visible: 34781 State: 33222 Matched RDB: 0
CO- Average: 0.32 St. Dev.: 0.9098 Valid: 39045
HC- Average: 67 St. Dev.: 189.95 Valid: 37467
NOx- Average: 675 St. Dev.: 905.98 Valid: 33321
All Valid Data = 30188
All Valid Data Mean: CO, HC, NOx, Speed and Acceleration is Valid

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